Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 16 (6): 1545–1550
https://doi.org/10.15560/16.6.1545

PENSOFT

First report of the Broad-toothed Tailless Bat, *Anoura latidens* Handley, 1984 (Chiroptera, Phyllostomidae), in Bolivia

Camilo A. Calderón-Acevedo[1, 2], Nathan Muchhala[1]

1 University of Missouri-St. Louis, Department of Biology, 1 University Blvd., St. Louis, Missouri, 63121, USA. **2** Rutgers University, Department of Biological Sciences, 195 University Ave, Newark, New Jersey 07102, USA.
Corresponding author: Camilo A. Calderón-Acevedo, camilo.calderon@rutgers.edu

Abstract
Anoura latidens Handley, 1984 is a nectarivorous bat with a wide elevational and latitudinal distribution, from Venezuela and Guyana to southeastern Peru. We reviewed mammal collections of the genus *Anoura* Gray, 1838 and identified two individuals previously attributed to *A. caudifer* (É. Geoffroy Saint-Hilaire, 1818) as *A. latidens* based on their premolar morphology and morphological measurements. In this note we report the first record of *A. latidens* in the Yungas forests of Bolivia, which extends its geographic range by 1,006 km southeast of its previous southernmost record in Peru.

Keywords
Chijchipa, Glossophaginae, nectarivorous bat, Nor Yungas, range extension, South America

Academic editor: Annia Rodríguez-San Pedro | Received 12 August 2020 | Accepted 17 September 2020 | Published 12 November 2020

Citation: Calderón-Acevedo CA, Muchhala N (2020) First report of the Broad-toothed Tailless Bat, *Anoura latidens* Handley, 1984 (Chiroptera, Phyllostomidae), in Bolivia. Check List 16 (6): 1545–1550. https://doi.org/10.15560/16.6.1545

Introduction

The Broad-toothed Tailless Bat, *Anoura latidens* Handley, 1984, is a large-bodied species of *Anoura* Gray, 1838 characterized by broad molars and premolars in comparison to the other species of the genus (Handley 1984). *Anoura latidens* was described from Pico Ávila, Caracas, Venezuela at 2,150 m a.s.l. and is reported from at least 14 localities in the country (Handley 1984). Most of these localities correspond to montane ecosystems, being more abundant in localities between 1,000 and 1,500 m a.s.l. in moist evergreen forests (Handley 1984; Linares 1998). *Anoura latidens* occupies a variety of ecosystems throughout South America and has an altitudinal range from 50 to 2,600 m a.s.l.

Outside of Venezuela; *A. latidens* is reported in Colombia, Guyana and Peru (Handley 1984; Solari et al. 1999, 2013; Alberico et al. 2000; Lim and Engstrom 2001; Mora-Beltrán and López-Arévalo 2018), although the records are scarce, widespread and with few specimens. In Colombia, this species is distributed from at least seven localities in the three cordilleras, most in the central and western cordilleras and, even though present in protected areas (Mora-Beltrán and López-Arévalo 2018), some localities are highly transformed landscapes (Calderón-Acevedo 2019). In Guyana, it is represented by a single specimen from the protected Iwokrama Forest, Cuyuni-Mazaruni, Kuwaima Falls, in the Pakaraima Highlands biogeographical region; this is the easternmost point of distribution of this species (Lim and Engstrom 2001). The current southernmost records correspond to two localities in the Yungas forests of

©The authors. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

southeastern Peru: one specimen from the department of Junín, Tarma, 2 km northwest of San Ramón (884 m a.s.l.) (revised by Handley 1984) and four specimens from the department of Pasco, Oxapampa, San Alberto (2,600 m a.s.l.) (revised by Solari et al. 1999). Currently, the southern distribution of *A. latidens* is limited to the eastern Andes, however, in the latest assessment from the International Union for Conservation of Nature (IUCN) Red List (Mantilla-Meluk and Molinari 2015) and the recent update of the distribution of Neotropical Noctilionoidea (Rojas et al. 2018), it was assumed that the western Peruvian Andes are part of the distribution of *A. latidens*, although there are no records to date. Only three species of *Anoura*, *A. caudifer* (É. Geoffroy Saint-Hilaire, 1818), *A. cultrata* Handley, 1960, and *A. geoffroyi* Gray, 1838 are reported from Bolivia. Here, we present the first records of *A. latidens* for Bolivia, extending its distribution southeast of Peru.

Methods

In a revision of the genus *Anoura* we visited the mammal collections of the American Museum of Natural History (AMNH) and the National Museum of Natural History, Smithsonian Institution (USNM). We measured the following characters to the nearest 0.01 mm: forearm, length of the tibia, greatest length of skull, zygomatic width, postorbital breadth, brain case breadth, height of brain case, maxillary tooth-row length, post palatal length, breath across third upper molars, breath across upper canines, mandibular length, and mandibular toothrow length. A total of 56 specimens were identified and measured. Taxonomic identification followed Handley (1984) and Griffiths and Gardner (2008).

Results

After a taxonomic revision of *Anoura* specimens we found two records of *Anoura latidens* for Bolivia, which were previously identified as *A. caudifer* (Anderson, 1997). These constitute the first records of this species in the country (Fig. 1).

Anoura latidens Handley, 1984

New records. BOLIVIA • 1 ♀; Department of La Paz, Province of Nor Yungas, Chijchipa; 16°05′S, 067°26′W; 1857 m a.s.l.; 7 July 1992; Sydney Anderson leg.; AMNH 264601. • 1 ♀ Department of La Paz, Province of Nor Yungas, Chijchipa; 16°09′S, 067°44′W; 1224 m a.s.l.; Sydney Anderson leg.; 5 July 1992; AMNH 264604.

Other material examined. COLOMBIA • Cundinamarca, San Juan de Río Seco; AMNH 69187. • PERU • Junín, Tarma, 2 km NW of San Ramón; AMNH 230218. • VENEZUELA • Distrito Federal, Caracas, Los Venados, 4 km NNW Caracas; 10°31′N, 066°54′W; USNM 370111–370116, 373703 • Distrito Federal, Caracas, Pico Ávila, 5 km NNE Caracas, near Hotel Humboldt; 10°33′N, 066°52′W; USNM 370118, 370119, 370122, 370124, 370126–370130. • Distrito Federal, Caracas, Pico Ávila, 6 km NNW Caracas, Nr. Boca Tigre; 10°33′N,

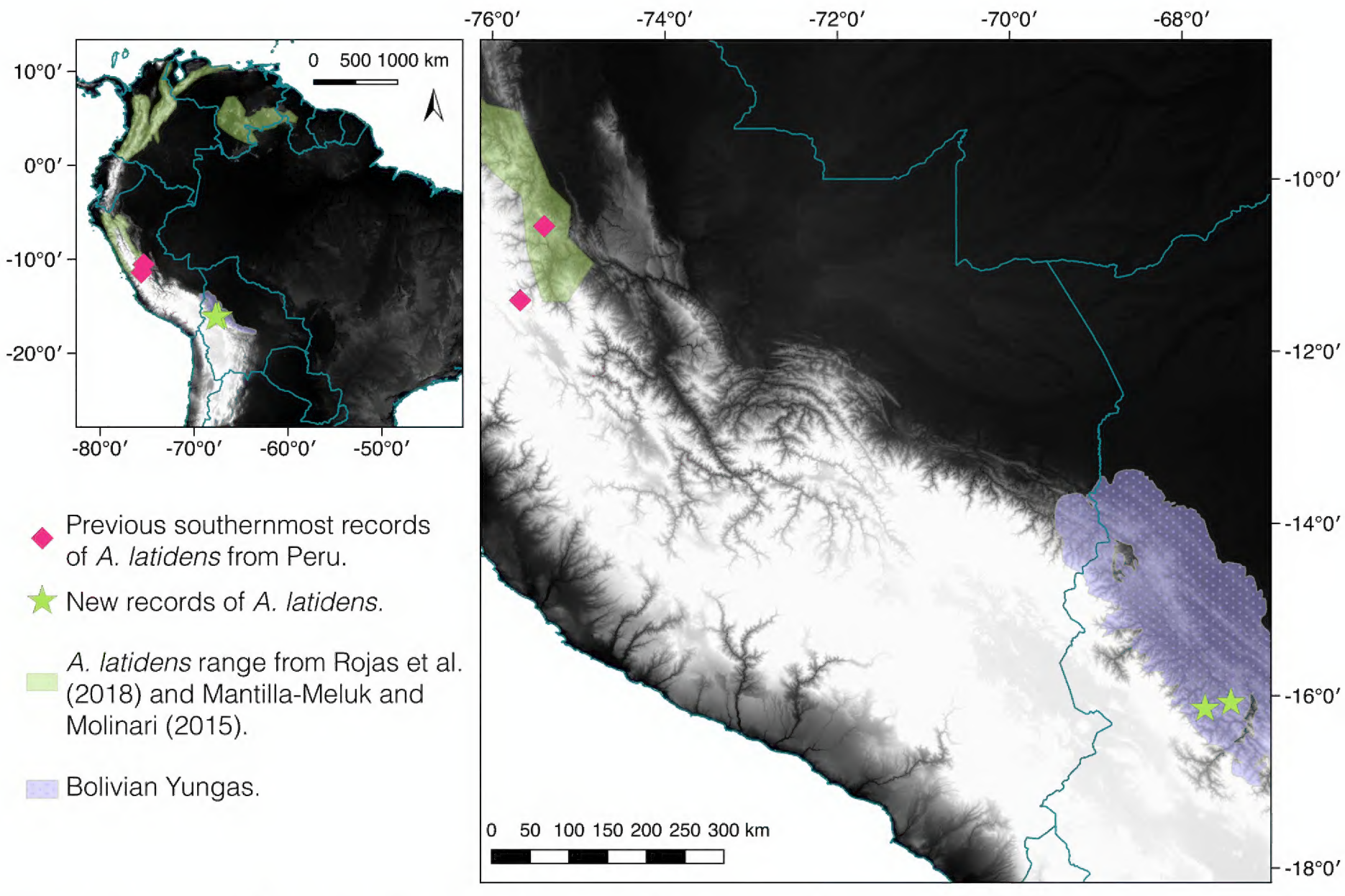

Figure 1. Current distribution of *Anoura latidens* in South America, following Mantilla-Meluk and Molinari (2015) and Rojas et al. (2018), and location of Peruvian records of *A. latidens* in relation to the first records (AMNH 264001, 264004) of *A. latidens* in Bolivia.

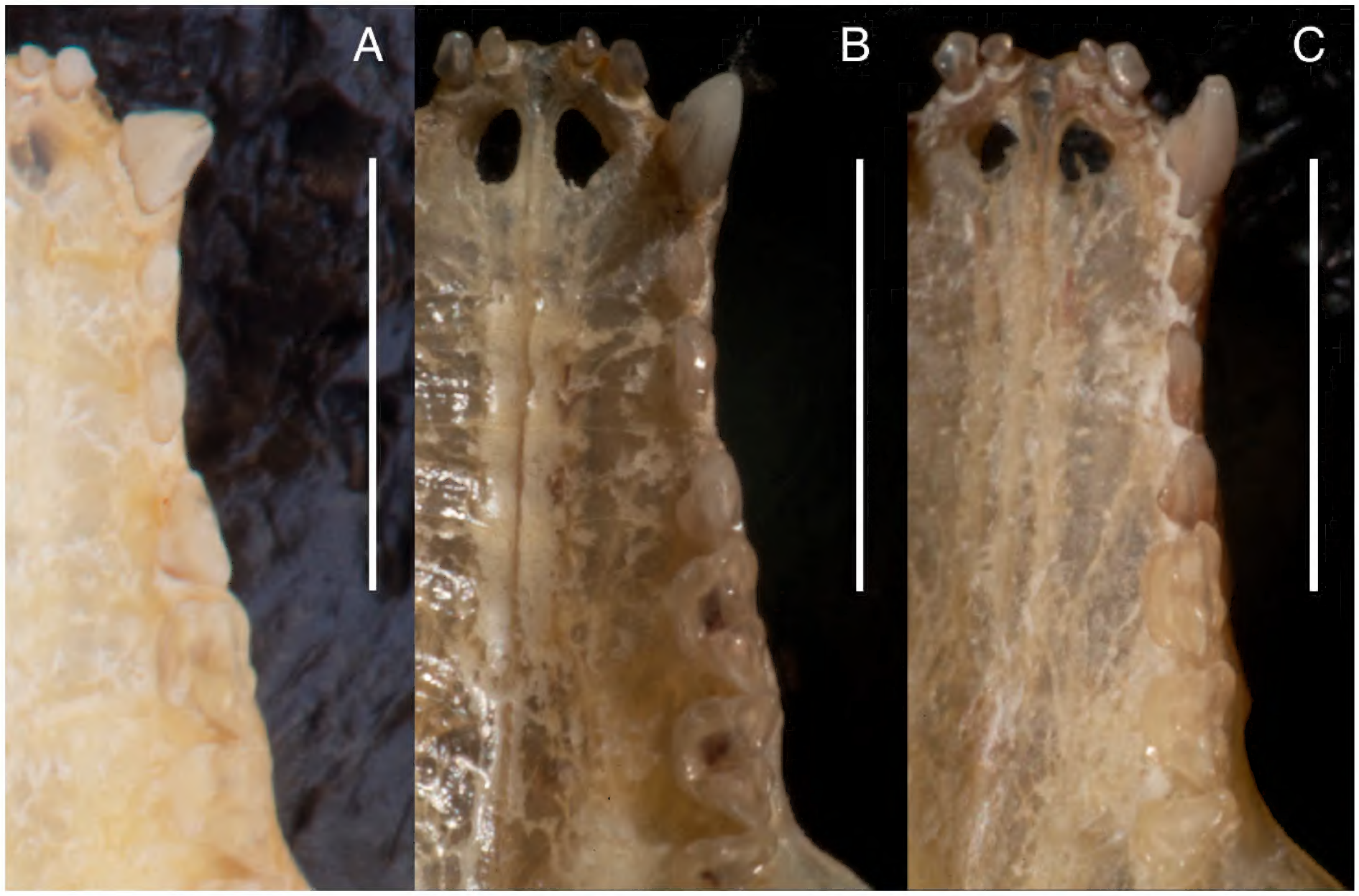

Figure 2. Ventral view of the skulls of *Anoura latidens*. **A.** *Anoura latidens*, holotype, USNM 370119. **B, C.** New records: (**B**) AMNH 264601; (**C**) AMNH 264604. Scale bars: 5.0 mm.

066°54′W; USNM 370123. • Department of Bolívar, km. 125, 85 Km SSE El Dorado; 05°58′N, 061°25′W; USNM 385806, 385807, 385809, 385814, 385817, 385839, 385840, 385842, 385845–385848, 385850, 385851, 385862, 385863, 385865, 385866, 385867, 385869, 385873. • Department of Bolívar, El Manaco, 59 km SE El Dorado, km 74; 06°16′N, 061°19′W; USNM 385883, 385884. • Department of Bolívar, Hato La Florida, 47 km ESE Caicara; 07°30′N, 065°46′W; USNM 389119, 389120. • Department of Sucre, Manacal, 26 km ESE Carupano; 10°37′N, 063°01′W; USNM 407863. • Department of Amazonas, San Juan, 163 km ESE Pto. Ayacucho, Rio Manapiare; 05°18′N, 066°13′W; USNM 407865, 407868–407871, 407874, 407875, 407878. • Department of Amazonas, Rio Negro, Cerro de La Neblina, 3.5 km W of Pico Zoloaga; 00°53′N, 065°56′W; AMNH 261230.

Identification. *Anoura latidens* is characterized by its unique dentition within *Anoura*. It is distinguishable from the small-bodied species of *Anoura,* including *A. cadenai* Mantilla-Meluk & Baker, 2006, *A. caudifer*, *A. fistulata* Muchhala, Mena & Albuja, 2005, *A. javieri* Pacheco, Sánchez-Vendizú & Solari, 2018, and *A. luismanueli* Molinari, 1994 by a combination of characters such as the presence of a medial internal cusp in the last upper premolar (P4), and a first lower molar (m1) with anteroexternal cuspid and cristid present. *Anoura latidens* has on average a larger skull (23.23–25.44 mm) than *A. luismanueli* (20.38–22.16 mm), while the skull size overlaps that of other, small-bodied *Anoura* species (Calderón-Acevedo 2019). *Anoura latidens* has a larger forearm (40.36–47.71 mm) than *A. caudifer* (32.68–38.40 mm), *A. cadenai* (34.93–38.0 mm), *A. fistulata* (35.0–40.0 mm), *A. javieri* (37.0–38.0 mm), and *A. luismanueli* (34.1–36.9 mm).

Although *A. latidens* is similar to the other two species of large-bodied *Anoura* (*A. geoffroyi* and *A. cultrata*) in terms of forearm and skull size, it has a unique dentition not present in any other species of *Anoura*. Specifically, it has a second upper premolar (P3) that lacks a developed anterobasal cusp (a trait found in *A. geoffroyi*) and a last upper premolar (P4) with a triangular shape caused by the medial-internal cusp being enclosed by the base of the P4, also lacking the distinct bladelike first lower premolar of *A. cultrata*.

Both specimens from Bolivia can be diagnosed as *A. latidens* and meet all the dental diagnostic criteria defined by Handley (1984), including a reduced anterobasal cusp on the second upper premolar (P3) and a triangular tooth base enclosing the anteriomedial cusp of the last upper premolar (Fig. 2). These specimens have measurements falling within the known range of variation in the other examined specimens of *A. latidens* (Table 1). These specimens also have short rostrums and incomplete zygomatic arches. We found that the fur of our Bolivian specimens of *A. latidens* is greyer in contrast to the pale-brown or sepia of Venezuelan specimens described by Handley (1984) (Fig. 3). This could

Table 1. Morphometric measurements of *A. latidens* (in millimeters) of Bolivian specimens (AMNH 264601, 264604) in comparison to the holotype (USNM 370119) and the series of Handley 1984.

	AMNH 264601	AMNH 264604	Holotype, USNM 370119	Examined *A. latidens*
Forearm	41.67	42.92	42.69	43.18 (40.36–47.71) SD = 1.47, *n* = 44
Tibia	14.45	15.34	14.97	14.32 (13.41–16.55) SD = 0.73, *n* = 44
Greatest length of skull	23.48	23.58	24.05	24.21 (23.23–25.25) SD = 0.45, *n* = 53
Zygomatic breadth	10.41	10.52	10.66	10.56 (9.92–11.10) SD = 0.28, *n* = 47
Postorbital breadth	4.80	4.97	4.81	5.04 (4.70–5.50) SD = 0.15, *n* = 53
Braincase breadth	9.60	9.65	9.50	9.69 (9.30–10.16) SD = 0.21, *n* = 53
Height of braincase	7.19	7.32	7.54	7.55 (7.14–8.07) SD = 0.20, *n* = 52
Maxillary tooth row	9.11	8.91	9.06	9.26 (8.90–9.61) SD = 0.17, *n* = 53
Postpalatal length	9.37	8.80	8.79	9.17 (8.74–9.89) SD = 0.27, *n* = 51
Breadth across molars	5.97	6.14	5.94	6.21 (5.75–6.50) SD = 0.18, *n* = 51
Breadth across canines	4.12	4.33	4.09	4.30 (3.95–4.65) SD = 0.18, *n* = 53
Mandibular length	16.77	16.70	16.89	17.36 (16.40–18.29) SD = 0.41, *n* = 53
Mandibular tooth row length	9.45	9.27	9.35	9.65 (9.31–10.08) SD = 0.20, *n* = 53

be due to intraspecific variation, since the external characters of *A. latidens* have not been evaluated thoroughly aside from the initial description and the scattered records from Colombia, Guyana, and Peru.

Discussion

This represents the first report of *Anoura latidens* in Bolivia. Previous work shows that this species is also distributed from the east of South America in Guyana, through the Venezuelan Guayana, and Andean regions, across the eastern and western Andes from Colombia, and in the eastern Peruvian Andes (Handley 1984; Solari et al. 1999, 2013; Alberico et al. 2000; Lim and Engstrom 2001; Mora-Beltrán and López-Arévalo 2018; Calderón-Acevedo 2019). It has not been reported in Ecuador. In Guyana, *A. latidens* is reported from the central Iwokrama forest (Lim and Engstrom 2001), a lowland Neotropical rain forest and one of the protected areas in South America with the highest recorded bat diversity. Records from Venezuela show the plasticity that this species exhibits in habitat selection; it is reported from 14 localities, occupying a wide variety of ecosystems, from lowland forest to the high Andean slopes of the Cordillera de Mérida, with most records in middle elevations from 1,000 to 1,500 m a.s.l. (Handley 1976, 1984; Ochoa et al. 1993; Linares 1998; Lew et al. 2009). Records from Colombia suggest a primarily Andean distribution in mid-elevation premontane forests (Alberico et al. 2000; Solari et al. 2013; Mora-Beltrán and López-Arévalo 2018; Calderón-Acevedo 2019). In Peru, *A. latidens* is reported only from two localities in the eastern Andes, at an elevation of 884 m a.s.l. (Handley 1984) and 2,600 m a.s.l (Solari et al. 1999), which is the highest recorded elevation for the species (Handley 1984; Solari et al. 1999).

The IUCN assessment of *A. latidens* is currently Least Concern, given that the species is reported in national parks through its range, has presumably stable populations, and, although areas of its distribution are under threat, there are presumably no major threats to its habitat (Mantilla-Meluk and Molinari 2015).

The paucity of individuals in collections indicates that *A. latidens* is a rare species (Arita 1993) with a scattered distribution and small populations. It was not previously reported for Bolivia (Anderson et al. 1982; Anderson 1985, 1993, 1997; Salazar-Bravo et al. 2003; Aguirre et al. 2010, 2019), and the new Bolivian records extend the geographic range of this species by 1,006 km southeast of its previously known southernmost record in Tarma, Junín, Peru (Handley 1984; Solari et al. 1999). The new records come from Yungas forests, which is one of the most diverse ecosystems in Bolivia. The Yungas include over 48% of the bat diversity in the country where 59 species have been recorded (Vargas and Patterson 2007). These forests are identified as important areas for bat conservation (Vargas et al. 2010). With this addition, the genus *Anoura* in Bolivia is represented by four species, *A. caudifer*, *A. cultrata*, *A. geoffroyi*, and *A. latidens* (Salazar-Bravo et al. 2003; Calderón-Acevedo and Muchhala 2018; Aguirre et al. 2019). The new records, along with the previous records from Peru and Colombia, suggest that *A. latidens* is more widespread in South America than previously thought, although apparently always in low abundances in its southern distribution.

Acknowledgements

We want to thank N. B. Simmons and the mammals' collection staff of the American Museum of Natural History as well as D. Lunde of the National Museum of Natural History, Smithsonian Institution, for their assistance while revising these collections. L. Siles provided helpful comments that improved this manuscript. We thank D. M. Morales-Martínez for his assistance with image processing and his comments on the manuscript. This research was funded by the Biology Graduate Student Association at University of Missouri–St. Louis, the Collection Visiting Grant of the American Museum of Natural History, and CAC's work during the writing of this manuscript was partly funded by a post-doctoral scholarship at the Soto Lab of Bat Biology (SLaBB) at Rutgers University Newark.

Figure 3. *Anoura latidens* fur coloration. **A, C.** *Anoura latidens*, holotype, USNM 370119. **B, D.** AMNH 264604.

Authors' Contributions

CAC collected the data and identified the specimens; CAC and NM wrote the manuscript.

References

Aguirre LF, Mamani CJ, Barboza-Marquez J, Mantilla-Meluk H (2010) Lista actualizada de los murciélagos de Bolivia. Revista Boliviana de Ecología y Conservación Ambiental 27 (1): 1–7.

Aguirre LF, Tarifa T, Wallace RB, Bernal N, Siles L, Aliaga-Rossel E, Salazar-Bravo J (2019) Lista actualizada y comentada de los mamíferos de Bolivia. Ecología en Bolivia 54 (2): 109–149.

Alberico M, Cadena A, Hernández-Camacho J, Muñoz-Saba Y (2000) Mamíferos (Synapsida: Theria) de Colombia. Biota Colombiana 1 (1): 43–75.

Anderson S (1985) Lista preliminar de mamíferos bolivianos. Cuadernos Academia Nacional de Ciencias de Bolivia 65 (3): 5–16.

Anderson S (1993) Los mamíferos bolivianos: notas de distribución y claves de identificación. Instituto de Ecología, Universidad Mayor de San Andrés, La Paz, 159 pp.

Anderson S (1997) Mammals of Bolivia: taxonomy and distribution. Bulletin of the American Museum of Natural History 231: 1–652.

Anderson S, Koopman KF, Creighton GK (1982) Bats of Bolivia: an annotated checklist. American Museum Novitates 2750: 1–24.

Arita HT (1993) Rarity in Neotropical bats: correlations with phylogeny, diet, and body mass. Ecological Applications 3 (3): 506–517. https://doi.org/10.2307/1941919

Calderón-Acevedo CA (2019) Taxonomy, species limits, and phylogenetic relationships of *Anoura* Gray 1838 (Chiroptera: Phyllostomidae). PhD dissertation, University of Missouri–St. Louis, Missouri, 137 pp.

Calderón-Acevedo CA, Muchhala NC (2018) Identification and diagnosis of *Anoura fistulata* with remarks on its presumed presence in Bolivia. Journal of Mammalogy 99 (1): 131–137. https://doi.org/10.1093/jmammal/gyx159

Geoffroy Saint-Hilaire É (1818) Sur de nouvelles chauve-souris, sous le nom de Glossophages. Mémoires du Muséum d'Histoire Naturelle 4: 411–418.

Gray JE (1838) A revision of the genera of bats (Vespertilionidae), and the description of some new genera and species. Magazine of Zoology and Botany 2: 483–505.

Griffiths TA, Gardner AL (2008) Subfamily Glossophaginae Bonaparte, 1845. In: Gardner AL (Ed.) Mammals of South America. Volume 1. Marsupials, xenarthrans, shrews, and bats. Mammals of South America. The University of Chicago Press, Chicago, 224–244.

Handley CO Jr (1960) Description of new bats from Panama. Proceedings of the United States National Museum 112 (3442): 459–479. https://doi.org/10.5479/si.00963801.112-3442.459

Handley CO Jr (1976) Mammals of the Smithsonian Venezuelan project. Brigham Young University Science Bulletin-Biological Series 20: 1–91. https://doi.org/10.5962/bhl.part.5667

Handley CO Jr (1984) New species of mammals from northern South America: a long-tongued bat, genus *Anoura* Gray. Proceedings of the Biological Society of Washington 97 (3): 513–521.

Lew D, Rivas B, Ferrer A (2009) Mamíferos de la cuenca alta del río Cuyuní, Estado Bolívar, Venezuela. In: Evaluación rápida de la biodiversidad de los ecosistemas acuáticos de la Cuenca Alta del Río Cuyuní, Guayana Venezolana. Conservation International, Arlington, 164–172.

Lim BK, Engstrom MD (2001) Species diversity of bats (Mammalia: Chiroptera) in Iwokrama Forest, Guyana, and the Guianan subregion: implications for conservation. Biodiversity and Conservation 10: 613–657. https://doi.org/10.1023/A:1016660123189

Linares OJ (1998) Mamíferos de Venezuela. Sociedad Conservacionista Audubon de Venezuela, Caracas, 691 pp.

Mantilla-Meluk H, Baker RJ (2006) Systematics of small *Anoura* (Chiroptera: Phyllostomidae) from Colombia, with description of a new species. Occasional Papers, Museum of Texas Tech University 261: 1–18. https://doi.org/10.5962/bhl.title.156897

Mantilla-Meluk H, Molinari J (2015) *Anoura latidens*. The IUCN Red List of threatened species 2015: e.T1568A22106814. https://doi.org/10.2305/iucn.uk.2015-4.rlts.t1568A22106814.en

Molinari J (1994) A new species of *Anoura* (Mammalia Chiroptera Phyllostomidae) from the Andes of northern South America. Tropical Zoology 7 (1): 73–86. https://doi.org/10.1080/03946975.1994.10539242

Mora-Beltrán C, López-Arévalo HF (2018) Interactions between bats and oral resources in a premontane forest, Valle del Cauca, Colombia. Therya 9 (2): 129–136. https://doi.org/10.12933/therya-18-560

Muchhala N, Mena P, Albuja L (2005) A new species of *Anoura* (Chiroptera: Phyllostomidae) from the Ecuadorian Andes. Journal of Mammalogy 86 (3): 457–461. https://doi.org/10.1644/1545-1542(2005)86[457:ansoac]2.0.co;2

Ochoa J, Molina C, Giner S (1993) Inventario y estudio comunitario de los mamíferos del Parque Nacional Canaima, con una lista de las especies registradas para la Guayana venezolana. Acta Científica Venezolana 44 (4): 245–262.

Pacheco V, Sánchez-Vendizú P, Solari S (2018) A new species of *Anoura* Gray, 1838 (Chiroptera: Phyllostomidae) from Peru, with taxonomic and biogeographic comments on species of the *Anoura caudifer* complex. Acta Chiropterologica 20 (1): 31–50. https://doi.org/10.3161/15081109acc2018.20.1.002

Rojas D, Moreira M, Ramos Pereira MJ, Fonseca C, Dávalos LM (2018) Updated distribution maps for neotropical bats in the superfamily Noctilionoidea. Ecology 99 (9): 2131–2131. https://doi.org/10.1002/ecy.2404

Salazar-Bravo J, Tarifa T, Aguirre LF, Yensen E, Yates TL (2003) Revised checklist of Bolivian mammals. Occasional Papers, Museum of Texas Tech University 220: 1–27.

Solari S, Pacheco V, Vivar E (1999) Nuevos registros distribucionales de murciélagos peruanos. Revista Peruana de Biología 6 (2): 152–159. https://doi.org/10.15381/rpb.v6i2.8310

Solari S, Muñoz-Saba Y, Rodríguez-Mahecha JV, Defler TR, Ramírez-Chaves HE, Trujillo F (2013) Riqueza, endemismo y conservación de los mamíferos de Colombia. Mastozoología Neotropical 20 (2): 301–365.

Vargas A, Patterson BD (2007) Comunidades de murciélagos montanos en Bolivia. In: Aguirre LF (Ed) Historia natural, distribución y conservación de los murciélagos de Bolivia. Centro de Ecología y Difusión Fundación Simón I. Patiño, Santa Cruz de la Sierra, 82–86.

Vargas A, Aguirre LF, Siles L, Terán MF, Moya I, Zambrana-Torrelio CM (2010) Patrones de riqueza potencial de especies y áreas importantes para la conservación de murciélagos (AICOMs) de Bolivia. Revista Boliviana de Ecología y Conservación Ambiental 27: 9–24.